MISSOURI MONTHLY VITAL STATISTICS

Provisional Statistics

From The

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October 2000 VOL. 34 NO. 8

Focus. . . Birth Defects and Infant Mortality

One of the most important health trends in the U.S. during the 20th century has been the reduction of high infant mortality rates. Statistics from the National Center for Health Statistics (NCHS) show that the U.S. infant mortality rate was reduced by 75 percent over the 1950-1996 time period. Resident infant mortality rates in the U.S. decreased by 70 percent, from a rate of 26.0 (deaths per 1,000 births) to 7.2, over the 1960-1997 time period[1]. Missouri's infant mortality rate has nearly mirrored the national trend.

Advances in health care and other related fields have played major roles in lowering infant mortality. As the lower rates have evolved, the important components that make up the infant mortality rate have changed dramatically. Overall infant mortality has decreased at a much faster pace than infant mortality for which the cause of death is coded to a birth defect. This has resulted in birth defects becoming an ever increasingly important component in the infant mortality equation over the past century. Nationally the percentage of infant deaths related to birth defects has steadily increased; from 7 percent in the 1910s, to 14.5 percent in 1968, to 20 percent in 1980, and now in the 1990s to 22 percent[2].

In this study we examined infant deaths (up to the first birthday) among 1993-97 Missouri resident births. We developed a data set derived from the Missouri Department of Health birth defects registry. The birth defects registry was established in part to monitor the incidence of birth defects among Missouri infants. The registry contains diagnoses of infants from a variety of different sources; which include birth certificates, infant death certificates, newborn patient abstracts, pediatric inpatient and outpatient abstracts and the Missouri Care System (MOCARES). The cause of death indicator is a commonly used method by which individual components of infant mortality are analyzed. It refers to the underlying cause of death recorded on the death certificate.

Compiling a rank list of selected causes of death is problematic due to the interrelated diagnoses identified in some infant deaths. Many health problems often arise related to prematurity and low birth weight. In cases of infant death, the cause of death is sometimes then coded to the complicating disorder and not to the premature birth code. Hence, the leading causes of infant death will differ depending on how the major categories are defined. For this study we used the National Infant Mortality Surveillance (NIMS) categories for infant deaths[3]. The NIMS system uses a relatively broad definition in assigning infant death causes to prematurity/low birth weight (ICD-9 codes 760-779 excluding most perinatal infections—codes 771.0-771.2 and 771.4-771.8).

Using the above organizational scheme, Figure 1 shows that complications arising from prematurity/low birth weight comprise the largest portion of infant deaths at 37 percent. Birth defects (codes 740-759 using ICD-9 classification scheme) ranked second on the chart and accounted for 24.3 percent (699 cases) of all infant deaths. However, this number also retains some ambiguity because some congenital anomalies play a supporting role in cases where an infant is diagnosed with a birth defect but eventually is determined to have died from some other cause. Therefore we also examined deaths among infants with any birth defect, regardless of the reported cause of death.

Overall, births with defects represent 5.4 percent of all Missouri births. Of that subset, 5.2 percent of children born with a defect died in infancy. This statistic contrasts with the 0.5 percent of infants born without a birth defect that died in infancy. Thus, children born with a defect were over ten times more likely to die in the first year of life compared to children born without a defect. Also, 36.2 percent of all infant deaths have at least one birth defect diagnosed—note that this does not necessarily mean a birth defect was listed as the cause of death. In fact, two-thirds (66.9 percent) of infants with a diagnosed birth defect who died had a defect listed as the cause of death.

Figure 2 examines what types of congenital anomalies are making the biggest contributions to infant mortality using cause of death as the indicator. In Figure 3, the percent of all infants with defects who died in infancy are presented by defect type. For each defect category two statistics are presented: a) the percentage of infants with defects that died, and whose death certificate indicated that defect as the cause of death; and b) the percentage of infants with the defect that died, regardless of the recorded cause of death. As mentioned above, 5.2 percent of children born with any birth defect died. However, using strictly cause of death drops the mortality rate for birth defects down to 3.5 percent. One important note before examining the different categories of birth defects is that although many children that die have multiple birth defects in different organ systems, only one of those defects can be coded as the cause of death. This explains in part why the individual birth defect component mortality percentages are so much higher than the mortality percentage for all birth defects (see Fig. 3).

The Figure 2 pie chart shows that 26.8 percent of infant birth defect caused deaths are associated with the cardiovascular system. Figure 3 shows that 9.2 percent of children

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with some type of heart defect died. In contrast, using only the heart defect codes in the cause of death category as the numerator produced a mortality rate of 3.9 percent. Unless otherwise stated, in this text we will use the more liberal definition of a birth defect death. It places in the numerator all infant deaths for which a birth defect was diagnosed.

Hypoplastic left heart syndrome (HLHS) is the single largest individual component of all heart defect deaths. It accounts for nearly one-third of all infant deaths due to cardiovascular defects. HLHS is characterized by an underdevelopment of the left ventricle that creates a reduced cardiac output and is usually fatal without intervention[4]. 69.1 percent of infants with the HLHS defect died within one year of birth. Other common heart defects had a much lower rate of mortality. Atrial septal defect and ventral septal defect were the two most often diagnosed birth defects among all children; however, the mortality rate for these two defects were 8.1 percent and 6.9 percent respectively. Other studies show that many cardiovascular defects (excluding HLHS) have declined substantially in terms of mortality in the past 15 years[5].

Circulatory/respiratory anomalies rank second (23.8 percent) in birth defect caused deaths (see Fig. 2). Overall, 9.9 percent of children with respiratory defects died in infancy (Fig. 3). Research shows that over the past 15 years respiratory defects nationally have been on the increase. This development is largely attributed to the increased use of the diagnostic code for lung ageneis/hypoplasia/dysplasia[5]. Nearly 60 percent of respiratory deaths were coded to this defect. To varying degrees, all of these disorders under lung agenesis, et. al. describe a lack of development of the lungs.

Central nervous system (CNS) disorders make up 19.1 percent of all infant birth defect deaths (see Fig. 2). While cardiovascular defects account for a higher number of deaths, infants born with CNS defects have a higher risk of infant death. Infants with defects associated with the central nervous system (9.0 percent) were over three times as likely (17.8 percent) to die as the overall birth defect average (5.2 percent—see Fig. 3). Using cause of death codes, nearly half of CNS defect deaths can be attributed to neural tube defects (NTDs). They occur when there is a defect associated with the closure of the bony casing that surrounds the spinal cord[4]. Spina bifida and anencephaly are the most common names associated with these types of disorders. Spina bifida describes a condition where some portion of the spinal cord is not fully enclosed. Anencephaly is a much more severe defect where the bony casing covering the brain is missing[4]. All forms of anencephaly result in death. Overall, neural tube defects had a mortality rate of 30.0 percent. As one would expect, nearly 70 percent of all NTD deaths are a result of anencephaly.

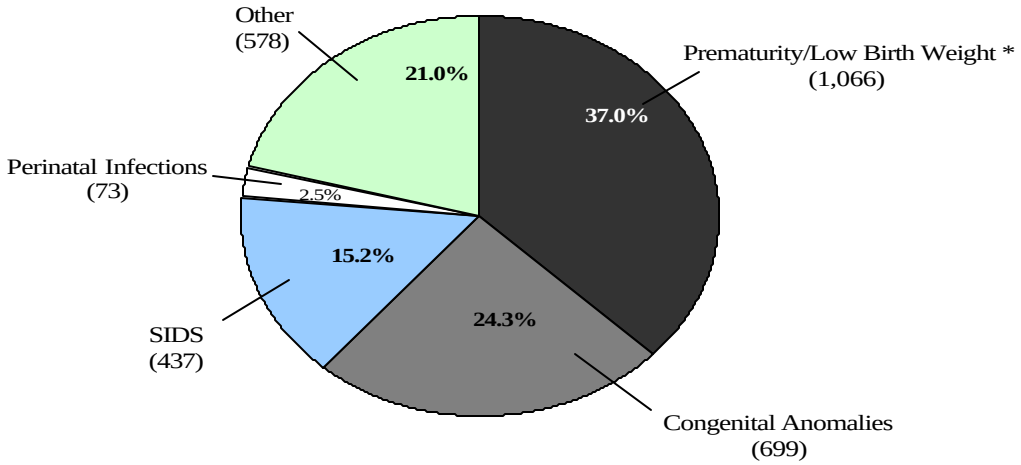
Health researchers in the past twenty years have provided strong evidence that NTD related pregnancies can be greatly reduced with appropriate vitamin supplements. Research has shown that for women at normal risk, taking .4 mg of synthetic folic acid may prevent up to 70 percent of all NTDs[6]. Because the neural tube and its associated parts develop within the first month of pregnancy and because nearly half of all pregnancies are estimated to be unplanned, all women of childbearing ages are recommended to consume the appropriate amounts of folic acid on a daily basis. Otherwise, by the time the pregnancy is recognized it will be too late for women to take advantage of the benefits of the folic acid supplement[6]. Statistics from a BRFSS study done in Missouri this year indicate that about half of women between the ages of 25-44 take a folic acid supplement. Women 18-24 have a much lower rate of 35.1 percent. The key to increasing these intake rates revolve around improving education concerning folic acid and then convincing women in the child bearing age groups to act on that information. Furthermore, recent studies show that folic acid supplementation may also decrease the risk for other defects, including congenital heart defects[7].

Chromosomal anomalies make up the fourth largest percentage (12.2 percent) of birth defect related deaths (Fig. 2). Chromosomal defects have the highest overall mortality percentage at 17.4 percent (Fig. 3). Examining the ratio of the two ways of analyzing birth defect related deaths shows that a child who died with a chromosomal defect was more likely to have it listed as the cause of death compared to all other major types of birth defects. The three primary types of chromosomal defects are Trisomy 13 (Patau), Trisomy 18 (Edwards), and Trisomy 21 (Down). Down Syndrome has by far the highest rate of incidence, making up nearly 60% of all chromosome defects. The mortality rate for these children was relatively low (7.5 percent) compared to the other two forms. T-18 has a mortality rate of 86.6 percentwhile T-13

Figure 1

Leading Causes of Infant Mortality

Missouri 1993-1997
N=2,884



Source: Missouri 1993-1997 DOH Birth Defects Registry

* This category defined using the NIMS classification system

(*Focus* continued)

has a slightly lower rate of 80.0 percent.

In conclusion, birth defect related deaths continue to be an integral component of the total infant mortality rate. The number of birth defect related infant deaths has not decreased in recent years as fast as the overall infant mortality rate. This has resulted in birth defect related infant deaths becoming a larger component of total infant mortality. Children born in Missouri with a birth defect are ten times more likely to die, compared to children born with no anomalies. Two-thirds of all birth defect caused deaths are attributed to either a cardiovascular or respiratory anomaly, or a central nervous system disorder. CNS disorders related to the neural tube are particularly important to track because of research that indicates folic acid supplementation may prevent many infants with NTDs. Current studies show that there is still much potential progress to be made related to pregnancies, folic acid intake, and NTD rates.

References:

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[3] Buehler, James, Lilo Strauss, Carol Hogue and Jack Smith. 'Birth Weight Specific Causes of Infant Mortality, 1980'. Public Health Reports Journal of the US Public Health Service. Vol. 102 No. 2.

[4] Wong, Donna. Essentials of Pediatric Nursing: Fourth Edition. Mosby Publishing: St Louis. 1993.

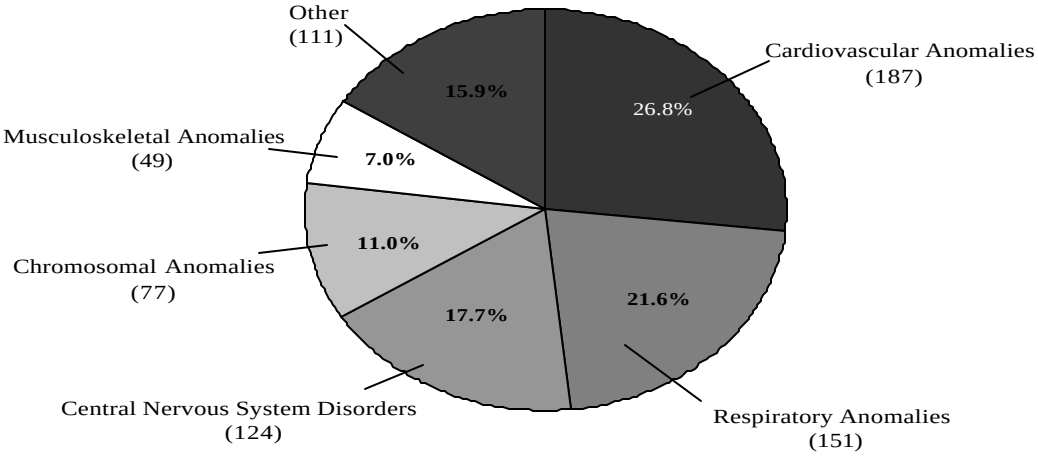
[5] 'Trends in Infant Mortality Attributable to Birth Defects—U.S. 1980-1995'. Morbidity and Mortality Weekly Report. Vol. 47, No. 37, Sept. 25, 1998.

[6] Honebrink, Ann. 'Folic Acid and the Prevention of Neural Tube Defects'. ACOG Clinical Review. Vol. 4 Issue 5, Sept./Oct. 1999.

[7] Hernandez-Diaz, Sonia, Martha Werler, Alexander Walker, and Allen Mitchell. 'Folic Acid Antagonists During Pregnancy and the Risk of Birth Defects'. The New England Journal of Medicine. Vol. 343 No. 22, Nov. 30, 2000.

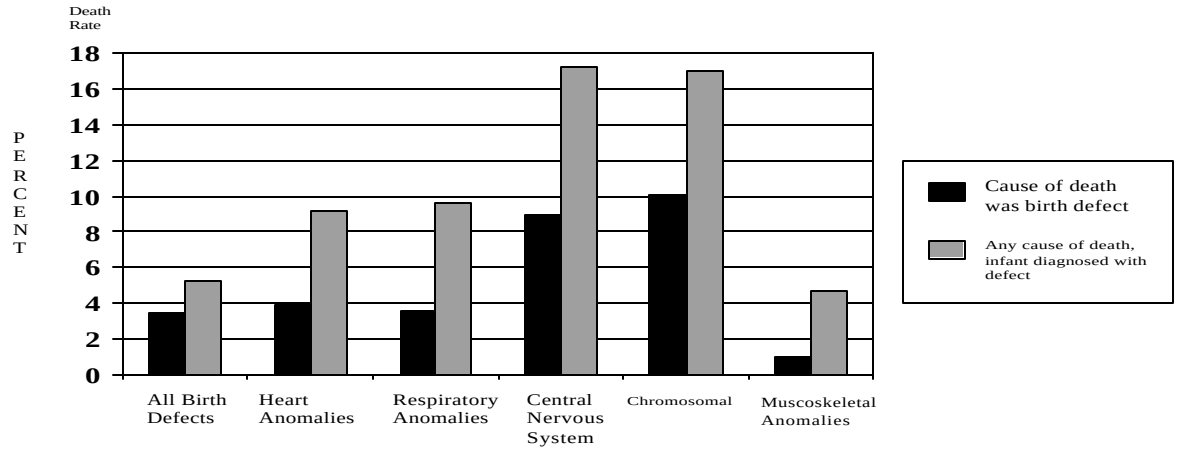
Figure 2 Leading Causes of Infant Deaths Related to Birth Defects

Missouri 1993-1997
N= 699



Source: Missouri 1993-1997 DOH Birth Defects Registry

Figure 3 Birth Defect Specific Infant Mortality



Source: Missouri 1993-1997 DOH Birth Defects Registry

Provisional Vital Statistics for August 2000

Live births increased in August as 7,048 Missouri babies were born compared with 5,959 in August 1999. Cumulative births for the 8- and 12-month periods ending with August also show increases. For January to August, births increased by 4.8 percent from 49,812 to 52,223.

Deaths increased slighty for all three time periods shown in the table below. There were 4,673 deaths to Missourians in August compared with 4,443 one year earier.

The **Natural increase** for Missouri in August was 2,375 (7,048 live births minus 4,673 deaths). The natural increase was also higher for the cumulative 8- and 12-month periods ending with August.

Marriages increased for all three time periods shown below. In August, 4,410 Missouri couples married compared with 4,088 one year earlier.

Dissolutions of marriage decreased in August, but increased for the cumulative 8- and 12-month periods ending with August.

Infant deaths increased for all three time periods shown below. However, the rate of infant mortality for the August and January - August periods decreased.

PROVISIONAL VITAL STATISTICS FOR AUGUST 2000

Item	August				Jan.-Aug. cumulative				12 months ending with August				
	Number		Rate*		Number		Rate*		Number		Rate*		
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1998	1999	2000
Live Births	5,959	7,048	12.0	15.2	49,812	52,223	13.6	14.2	76,517	78,169	13.7	14.0	14.2
Deaths	4,443	4,673	9.0	10.1	37,262	37,393	10.2	10.2	54,670	55,086	9.9	10.0	10.0
Natural increase ...	1,516	2,375	3.1	5.1	12,550	14,830	3.4	4.0	21,847	23,083	3.8	4.0	4.2
Marriages	4,088	4,410	8.2	9.5	29,406	29,425	8.1	8.0	43,716	44,388	8.0	8.0	8.1
Dissolutions	1,997	1,910	4.0	4.1	16,312	17,636	4.5	4.8	24,701	25,907	4.7	4.5	4.7
Infant deaths	43	50	7.2	7.1	375	387	7.5	7.4	561	600	7.9	7.3	7.7
Population base .... (in thousands)	...	...	5,468	5,500	...	...	5,468	5,500	...	...	5,428	5,459	5,490

* Rates for live births, deaths, natural increase, marriages and dissolutions are computed on the number per 1000 estimated population. The infant death rate is based on the number of infant deaths per 1000 live births. Rates are adjusted to account for varying lengths of monthly reporting periods.